Tunable hydrogels for therapeutic delivery of multipotent stem cells.

Grant Award Details

Tunable hydrogels for therapeutic delivery of multipotent stem cells.

Grant Type: New Faculty Physician Scientist

Grant Number: RN3-06460

Project Objective: To utilize a high-throughput screen to identify novel MSC-binding small molecules to be incorporated into a tunable PEG-hydrogels to treat skin ulcers/chronic wounds and to increase stem cell viability and the rate of wound healing when applied to a wound bed.

Investigator:

Name:	Emanual Maverakis
Institution:	University of California, Davis
Type:	PI

Disease Focus: Skin Disease

Human Stem Cell Use: Adult Stem Cell

Cell Line Generation: Adult Stem Cell

Award Value: $2,772,000

Status: Active

Progress Reports

Reporting Period: Year 1

View Report

Reporting Period: Year 2

View Report

Reporting Period: Year 3

View Report

Reporting Period: Year 5

View Report

Grant Application Details

Application Title: Tunable hydrogels for therapeutic delivery of multipotent stem cells.

Public Abstract: Rationale: Skin ulcers represent the largest economic burden of all skin diseases. Human adult stem cell therapies for the treatment of chronic wounds have shown considerable promise. However, a delivery system is needed before they can be used clinically. Hydrogels have emerged as a promising vehicle for stem cell delivery because their 3-D structure and high water content mimic the natural environment of the stem cell. However, the surface of some hydrogels cannot interact well with stem cells. Our objective is to develop hydrogels with small adhesion contact sites for stem cells to allow the stem cells to interact better with the hydrogels. We will also make hydrogels with other biomolecules to better promote wound healing. If successful this research will lead to new therapies for chronic wounds.

Statement of Benefit to California: Diseases of the skin are among the medical conditions in which spending has increased the most. Within this group, skin ulcers represent the largest economic burden. In 2004, the prevalence of skin ulcers was 4.8 million, far below the prevalence of other common skin diseases. However, the total healthcare cost for these patients, not including intangible cost due to quality of life impact, was $11.951 billion. This is five times higher than the economic burden of non-melanoma skin cancer, the most prevalent cancer in the U.S.. Current treatment options for patients with ulcers are limited and often ineffective. Even with the best care, the healing rate is only between 30-70% at 6 months and the recurrence rate is >70%. Ulcers are also a major risk factor for amputation, especially in patients with diabetes. This is true for people of any state, including California. Human adult stem cell therapies for the treatment of chronic wounds have shown considerable promise. However, their clinical application is predicated on developing an appropriate delivery platform, and relatively little research has been conducted in this area with respect to cutaneous wound healing. This proposal outlines an approach to develop novel stem cell delivery platforms. If successful this will lead to new treatments for chronic wounds.